In claim 31 on line 6, after "to", insert --, but not within,-- .

In claim 32 on line 6, after "to", insert --, but not within,-- .

In claim 33 on line 6, after "to", insert --, but not within,-- .

## REMARKS

### Drawings

The Examiner has commented:

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the inverter connected between the switch and sensor as set forth in claims 12 and 22 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

The Applicant respectfully suggests that the drawings do show the inverter.

Lines 17 through 24 on page 13 of the specification provide:

> To cause the drive wheel **1** to tend to rotate in a reverse direction when the first method is utilized, the computer **5** can be programmed to invert the output signal that it sends to the switch **31**. (Alternatively, an inverter **33** can be placed--preferably through electronic switching directed by the computer **5**--between the sensor **3** and the computer **5**.) To accomplish this same goal when the timing circuit **50** is employed, the inverter **33** is placed (preferably by electronic switching operated by a user) between the sensor **3** and the timing circuit **50**. And to achieve a similar result with the third method, the inverter **33** is placed (preferably by electronic switching operated by a user) between the sensor **3** and the switch **31**.

Additionally, line 16 on page 10 through line 4 on page 11 of the specification indicate:

> Figure 9 shows an air-cooled version of the Electric Motor with Rotor Being a Drive Wheel using a timing circuit to control the speed of the drive wheel.

Figure 10 illustrates a liquid-cooled version of the Electric Motor with Rotor Being a Drive Wheel using a timing circuit to control the speed of the drive wheel.

Figure 11 is a view of the same embodiment as that of Figure 10 except that the electromagnets are straight, rather than curved.

Figure 12 differs from the embodiment of Figure 11 only in that three electromagnets, rather than two, have been utilized.

Figure 13 shows an air-cooled version of the Electric Motor with Rotor Being a Drive Wheel when only a switch or switches are utilized to connect the source of electrical energy to the electromagnets.

Figure 14 illustrates a liquid-cooled version of the Electric Motor with Rotor Being a Drive Wheel when only a switch or switches are utilized to connect the source of electrical energy to the electromagnets.

Figure 15 is a view of the same embodiment as that of Figure 14 except that the electromagnets are straight, rather than curved.

Figure 16 differs from the embodiment of Figure 15 only in that three electromagnets, rather than two, have been utilized.

Claim 12 involves the timing circuit **50**, and claim 22 has neither a computer **5** nor a timing circuit **50** but only a switch or switches **31**. Figures 9 through 12 show the inverter **33** for the embodiment of claim 12; Figures 13 through 16 show the inverter **33** for the embodiment of claim 22. If this does not meet the concern of the Examiner, Applicant respectfully requests a clarification as to what feature with respect to the inverter **33** is missing from the drawings.

## Claims

### Claim Objections

The Examiner further states:

Claims 19 is objected to under 37 CFR 1.75©, as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the

claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 19 depends from claim 16. Claim 19 is identical to claim 16.

To rectify the preceding error, claim 19 has been amended to depend upon claim 17.

Claim Rejections

35 U.S.C. § 112

The Examiner also declares:

> Claims 12-13 and 22-23 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Applicant's disclosure does not provide an enabling description of the inverter electronically connected between the sensor and the switch.

The Applicant respectfully suggests that the disclosure is enabling for one of ordinary skill in the field of electric motors.

Lines 4 through 14 and 22 through 26 on page 7 of the present application explain:

> With all three methods the electrical signal from the sensor is either on or off (not a continuum of possible values). Therefore, with the first method, the computer can be programmed to invert the signal it sends to the switch. (Alternatively, and [*sic*] inverter could be placed--preferably through electronic switching operated by a user--between the sensor and the computer.) This will cause the switch controlling current to the electromagnets to be activated at the times other than those when magnetic attraction or repulsion between the permanent magnet and an electromagnet will produce a force in the original direction that it was desired to rotate the drive wheel. This will, consequently, at times produce no force and at other times produce a force that tends to cause the drive wheel to rotate in the reverse direction. If the drive wheel were already rotating in a forward direction, this would initially have a braking effect. If continued, it would ultimately result in the drive wheel rotating in the reverse direction. . . .
>
> Similarly, to obtain a force that tends to rotate the drive wheel in a reverse direction with the second method, an inverter is placed (preferably through electronic switching operated by a user) between the sensor and the timing circuit. And to accomplish this feat with the third method, an inverter is placed

(preferably through electronic switching operated by a user) between the sensor and the switch.

On pages 226 and 227 of the *CMOS Cookbook*, authored by Don Lancaster, revised by Howard M. Berlin, published by Howard W. Sams & Company (a division of Macmillan, Inc.), copyrighted in 1977 and 1988, Internation Standard Book Number 0-672-22459-3, Library of Congress Catalog Card Number 87-63171, the understanding in the art is provided:

> The simplest possible direct-logic blocks have one input and one output. The operation of a logic block is usually shown with a chart called a *truth table*. Truth tables simply list the output or outputs obtained for all possible input combinations.
>
> . . .
>
> The truth table of Fig. 3-3D gives a one when the input is a zero, and vice versa. This is called an *inverter*. Inverters are used to generate the *complement* of a logic signal or to change the definition of a logic signal from positive to negative or back again. . . .

It seems clear to Applicant that the inverter is placed between the sensor and the timing circuit, in the case of claims 12 and 13, and between the sensor and the switch, in the case of claims 22 and 23, in order to generate the complement of the logic signal from the sensor and thereby to tend to cause the drive wheel to rotate in the opposite direction from what it would do in the absence of the inverter.

If this does not satisfy the Examiner, the Applicant respectfully requests clarification of the basis for this rejection.

35 U.S.C. § 102(b)

The Examiner has declared:

> Claims 1-2, 11-12, 21-22 and 31-33 are rejected under 35 U.S.C. 102(b) as being anticipated by Stridsberg.

Stridsberg discloses an electric motor having a drive wheel (102) with permanent magnets (101) attached to it, electromagnets (110) arranged opposite the permanent magnets, a sensor (112), a switch (411,421,431,413,423,433) and a computer (451). The assembly is supported by a structure (109). The controller of Stridsberg provides an inverting function to change the switches in order to effect braking of the motor.

Applicant respectfully must indicate that Stridsberg does not meet the limitations of the claims in questions. The critical distinguishing feature in each of the device claims is:

> one or more permanent magnets attached to said drive wheel with opposite magnetic poles adjacent to one another;
>
> one or more electromagnets attached to said structure and arranged generally in a plane that is substantially parallel to the plane or planes containing said permanent magnets, said electromagnets being sufficiently close to said permanent magnets that the magnetic fields of said electromagnets and said permanent magnets will interact with one another;
>
> . . .

And the analogous critical distinguishing steps of the method claims are:

> attaching to said drive wheel one or more permanent magnets with opposite magnetic poles adjacent to one another;
>
> attaching to said structure one or more electromagnets arranged generally in a plane that is substantially parallel to the plane or planes containing said permanent magnets, said electromagnets being sufficiently close to said permanent magnets that the magnetic fields of said electromagnets and said permanent magnets will interact with one another;
>
> . . .

For further clarity, claims 1, 11, 21, 31, 32, and 33 as well as the disclosure have been amended expressly to assert that the electromagnets are in a plane that is substantially parallel to, *but not within*, the plane or planes containing the electromagnets. Applicant believe that the word "parallel" implicitly conveys the same understanding and that Figures 2, 3, 5, 6, 9, 10, 11, 12, 13, 14, 15, and 16 reinforce such belief. At least, Applicant respectfully suggests, the figures provide any requisite antecedent basis.

The Stridsberg patent, United States patent no. 5,442,250, explains, on lines 5 through 8 of column 11 and 16 through 19 as well as 29 through 30 of column 12:

> The essential parts in FIG. 1 as regards this invention are the rotor **101**, the stator **110** and the protruding parts of the windings **111**. These parts forms [*sic*] a "ring" or a cylinder. . . .
>
> The outer rotor **101** in FIG. 2 comprises an outer cylindrical ring **201**of a magnetically permeably material like iron and magnet poles **202** of permanent magnet material . . . .
>
> The stator as indicated at **110** in FIG. 1 comprises a base ring **203** . . . .

Thus, the elements containing the various magnets in Stridsberg are two cylinders or rings with the magnets on parts of the cylinders that face each other. The magnets are not in parallel planes. They are in the same plane.

The motor of Stridsberg is a radial motor whereas the motor of the present invention is an axial motor.

On pages 121 through 122 of *Brushless Permanent-Magnet Motor Design* by Duane C. Hanselman, published by McGraw-Hill, Inc., copyrighted 1994, ISBN 0-07-026025-7, the following explanation is given:

> Two topologies were identified at the beginning of Chap. 4. When magnet flux travels in the radial direction and interacts with current flowing in the axial direction, torque is produced. Likewise, magnet flux traveling in the axial direction and interacting with radial current flow produces torque. These topologies are called radial and axial flux, respectively. The radial flux topology is the familiar cylindrical motor considered earlier in this chapter. A motor having axial flux topology is often called a pancake motor because the rotor is a flat disk.

Moreover, this book teaches away from the present invention, indicating on page 122, that a stator should be on both sides of the rotor for motors having axial flux topology in order to

have ". . . the rotor-stator attractive forces . . . balanced and no net axial or thrust load . . . on the motor bearings . . . ."

35 U.S.C. § 103(a)

The Examiner next proclaims:

> Claims 5-6, 8-9, 15-16, 18-19, 25-26 and 28-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stridsberg in view of Wakuta ('579).
>
> Stridsberg discloses the electric motor essentially as claimed except for a cavity in which a heat transferring or heat absorbing material is provided along with a radiating surface.
>
> Wakuta teaches that it is well known to provide a cavity (20) in which a heat transferring material (oil) is circulated to cool the motor windings. A radiating surface (14, 15) is provided to cooperate with the cavity to remove heat from the material. Thus, the motor is efficiently cooled.
>
> It would have been obvious to one of ordinary skill in the art at the time of the invention to have provided, in the motor of Stridsberg, a cavity with a heat transferring or absorbing material therein in communication with the electric motor in order to cool the electric motor, as shown by Wakuta. It would have been further obvious to have provided a radiating surface, as disclosed by Wakuta, to remove heat from the material whereby the electric motor will be efficiently cooled.

The preceding explanation of the distinguishing features of the present invention as compared to Stridsberg, itself, renders the presently considered claims not obvious. Yet, even more, Wakuta (United States patent no. 5,156,579) does not teach a cavity containing a heat-absorbing medium; and the oil in Wakuta is circulated by an oil pump motor **16**. The present invention does not require circulation for the claims in question. The heat can be transferred without any flow of the heat-transfer medium, such as through conduction.

Finally, the Examiner observes:

> Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stridsberg in view of Lutz.

Stridsberg discloses the electric motor essentially as claimed except for providing input from the user to program the controller and inverter between the sensor and the switches.

Lutz teaches that it is well known to allow user input to a computer controlled electric motor system in order to program the computer with the desired operation of the system, see figure 3.

It would have been obvious to one of ordinary skill in the art at the time of the invention to have allowed user input to the controller of Stridsberg in order to select the desired operating characteristics of the system, as shown by Lutz.

Again, the preceding explanation of the distinguishing features of the present invention as compared to Stridsberg, itself, renders the presently considered claims not obvious.

The Examiner does also say:

> Claims 3-4, 7, 10, 13-14, 17, 20, 23-24, 27 and 30 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

These claims have not been rewritten because of the preceding explanation of the reasons that the base claims should not be rejected.

Considering all the preceding, Applicant respectfully requests that the Examiner allow claims 1 through 33.

DATED this 3rd day of August, 2000.

Respectfully,

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